

## Chapter 9 Concrete Investigation Reports

### 9-1. General

When required by a major rehabilitation project, a concrete materials design memorandum, in the form of a separate report or a part of The Rehabilitation Evaluation Report, will be prepared. The need for repairs can vary from such minor problems as shrinkage cracks and pop-outs to major damage resulting from severe cavitation or abrasion or from structural failure. Therefore, the scope of the investigation will also vary, depending on the criticality of the project. For minor (noncritical) repair of concrete structures in moderate climates, the investigation may be limited to determining the availability of satisfactory repair materials. Examples of such repairs include patching small spalls and sealing dormant cracks in southern states. If the environment of the project is known to be deleterious to concrete, such as cycles of freezing and thawing, sulfate attack, or acid attack, the investigation must address the measures to be taken to mitigate deterioration, regardless of the quantity of repair materials involved. A more detailed investigation will normally be required for rehabilitation of structures such as locks, dams, large pumping stations, and power plants.

### 9-2. Concrete Materials Design Memorandum

In general, a design memorandum will include information as required in Appendix C of EM 1110-2-2000. In addition, for all repair or rehabilitation projects other than minor repairs, the design memorandum will also include the following:

- (1) Description of the existing conditions and types of deterioration.
- (2) Detailed discussion of the causes of deterioration.
- (3) Proposed method(s) of removal of damaged and deteriorated concrete.
- (4) Proposed repair materials and detailed repair procedures.

If epoxy or other polymer materials are to be used in the repair, detailed discussion of the materials and justifications for using such materials should also be given. Chapter 4 provides more detailed planning and design considerations. Although the requirements for a materials design memorandum may appear to be unnecessary detail for a project involving only a small quantity of repair materials, experience has repeatedly demonstrated that no step in a repair operation can be omitted or carelessly performed without detriment to the serviceability of the work. Inadequate investigation into the causes of the problem and inadequate workmanship, procedures, or materials will result in inferior repairs which ultimately will fail.

### 9-3. Concrete Repair Report

At the conclusion of any unique concrete repair project, an as-built concrete repair report should be prepared. Unique repair projects are those on which unusual concrete repair materials and techniques are used. The concrete repair report should include discussions of problems encountered in each phase of the repair work, effectiveness of the repair materials and techniques, and results of the follow-up evaluation program, if available.